

Influence of Internet Addiction on Pre-Service Mathematics Teachers' Learning and Motivation in Nigerian South-West Universities

Sabainah Oyebola Akinoso

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Sabainah Oyebola Akinoso ^{a*} 

^a Department of Science Education, Faculty of Education, University of Lagos, Nigeria

*Corresponding author: sakinoso@unilag.edu.ng

Abstract

Keywords:

internet addiction; pre-service teacher; academic performance; motivation.

The widespread use of the internet has led to a growing concern about the impact of internet addiction on pre-service Mathematics teachers' learning. This paper investigates the impacts of internet addiction on the learning and professional development of pre-service Mathematics teachers. The population covers the undergraduate Mathematics education students from public universities in south-west Nigeria. The sample was randomly selected from 100 to 400 levels while the sample size was 200 pre-service teachers across the levels from one selected university. A well-structured questionnaire was used to get data from pre-service Mathematics teachers on internet addiction. This study employed a descriptive and inferential research design to create responses to the research questions. The data collected were analysed using mean and standard deviation for the two research questions while Pearson Product Moment Correlation Coefficient was used to test the hypothesis raised. There is a significant relationship between internet addiction and Mathematics learning. This yields a positive result that, the students who access the internet more frequently learn more effectively and highly motivated in learning Mathematics. It was suggested that the internet can be a useful tool for learning but must be used responsibly. However, addressing internet addiction through education, prevention, and intervention efforts should be integrated into the teacher education program to support pre-service mathematics teachers in developing healthy internet use habits and maintaining high levels of motivation to learn.

Zusammenfassung

Schlüsselworte:

Internetsucht; Lehrer im Vorbereitungsdienst; akademische Leistung; Motivation.

Die weit verbreitete Nutzung des Internets hat zu einer wachsenden Besorgnis über die Auswirkungen der Internetsucht auf das Lernen von angehenden Mathematiklehrern geführt. In diesem Beitrag werden die Auswirkungen der Internetsucht auf das Lernen und die berufliche Entwicklung von angehenden Mathematiklehrern untersucht. Die Grundgesamtheit umfasst die Studenten der Mathematikausbildung an öffentlichen Universitäten im Südwesten Nigerias. Die Stichprobe wurde nach dem Zufallsprinzip aus 100 bis 400 Niveaus ausgewählt, während die Stichprobengröße 200 angehende Lehrkräfte aller Niveaus an einer ausgewählten Universität betrug. Ein gut strukturierter Fragebogen wurde verwendet, um Daten von angehenden Mathematiklehrern über Internetsucht zu erhalten. Diese Studie verwendete ein deskriptives und inferentielles Forschungsdesign, um Antworten auf die Forschungsfragen zu erhalten. Die gesammelten Daten wurden mit Hilfe von Mittelwert und Standardabweichung für die beiden Forschungsfragen analysiert, während der Pearson-Produkt-Moment-Korrelationskoeffizient verwendet wurde, um die aufgestellte Hypothese zu testen. Es besteht ein signifikanter Zusammenhang zwischen Internetabhängigkeit und Mathematiklernen. Daraus ergibt sich das positive Ergebnis, dass die Schüler, die häufiger auf das Internet zugreifen, effektiver und hoch motiviert Mathematik lernen. Es wurde vorgeschlagen, dass das Internet ein nützliches Werkzeug für das Lernen sein kann, aber verantwortungsvoll genutzt werden muss. Die Bekämpfung der Internetsucht durch Aufklärung, Prävention und Intervention sollte jedoch in die Lehrerbildung integriert werden, um angehende MathematiklehrerInnen dabei zu unterstützen, gesunde Internetnutzungsgewohnheiten zu entwickeln und ein hohes Maß an Lernmotivation aufrechtzuerhalten.

1. Introduction

Information and communication technologies have become indispensable tools for education, business, and personal use, transforming the way to learn, work, and interact with others (Fuchs, 2021). However, the use of the internet for non-educational purposes such as social media, gaming, online business, shopping, video and movies watch just to mention the positive usage, has the potential to distract pre-service teachers from academic responsibilities

and affect learning and academic performance either positively or negatively. Internet usage on smartphone can contribute positive to learning if used for educational purposes in searching for relevant educational information. Smartphone addiction has become a growing concern, with individuals experiencing negative consequences such as reduced productivity, sleep disturbances, and interpersonal conflicts (Lepp et al., 2015). Studies have shown that



excessive use of social media platforms can lead to negative outcomes, such as social isolation, anxiety, and depression, particularly among young people (Twenge, 2019).

As averred by some researchers, excessive internet use can have negative effects on an individual's well-being (Kuss et al., 2013; Laconi et al., 2014). Internet addiction has been associated with negative psychological outcomes, such as depression, anxiety, and stress (Griffiths, & Kuss, 2017). Also, study suggests that excessive internet use may be associated with physical health problems, such as poor sleep quality and obesity (Lin, 2019). Online communities and social networks can provide a sense of belonging and social support, which can be particularly valuable for individuals who are geographically isolated, have limited social networks, face stigmatization or discrimination in their offline lives (Ellison et al., 2011). Ellison et al. (2020) conducted extensive research on the social implications of online technologies. In this statement, the positive effects of online communities and social networks on social connection were highlighted, which is consistent with Morahan-Martin's (2003) perspective on the potential benefits of the internet for lonely individuals. The statement emphasizes the importance of recognizing the diverse ways in which technology use can impact social well-being and the need for more nuanced approaches to understanding the complex relationships between technology and social life.

Liu et al. (2021) explored the relationship between internet access and internet addiction among Chinese adolescents. The study found that adolescents who reported using the internet for entertainment purposes were more likely to develop internet addiction. Developing a deep understanding of pre-service teachers' beliefs and attitudes towards diversity is crucial for preparing future educators that emphasize the importance of understanding pre-service teachers' beliefs for effective classroom practice. Recent studies have emphasized the importance of considering individual learning styles in educational settings. The impact of internet addiction on pre-service mathematics teachers' learning has been the subject of several studies in recent years. Kim et al. (2018), found that pre-service teachers identified as having internet addiction had significantly lower scores on mathematics achievement tests compared to those without internet addiction. Also, the study found that pre-service teachers with internet addiction reported lower levels of motivation and engagement in mathematics classes.

Another study, by Lin, Lin, (2019), investigated the relationship between internet addiction and academic performance in pre-service mathematics teachers and found that the excessive use of the internet was negatively associated with the pre-service teachers' academic performance. Maqableh et al. (2021) found no correlation between university students internet addiction and academic performance. Furthermore, the study identified that pre-service teachers who spent more time on the internet also had higher levels of anxiety and depression. Internet addiction can have a positive or negative impact on the learning and academic performance of pre-service mathematics teachers, as well as their mental well-being.

Internet addiction among pre-service mathematics teachers may also have implications for their professional development. Mathematics is an essential subject that contributes to everything in life. The teaching and learning of mathematics should be handled in such a way that makes all students learn regardless of their differences. Pre-service mathematics teachers are the future of mathematics education, and their preparation and training are critical to ensuring the quality of mathematics education in the future. Pre-service teachers are expected to develop pedagogical and technological skills for effective teaching in the digital age. However, excessive internet use may divert their attention from acquiring necessary teaching skills, resulting in inadequate preparation for future teaching careers. Furthermore, internet addiction may also affect their ability to model appropriate technology use for their students, which is a crucial aspect of digital citizenship. There is a need for interventions and strategies to address internet addiction among pre-service mathematics teachers.

Educational institutions can implement interventions, such as workshops, seminars, and training programs, to raise awareness about internet addiction, its impacts, and strategies for healthy internet use. Pedagogical approaches, such as incorporating technology in a purposeful and meaningful way, can also help pre-service teachers develop responsible and balanced internet use habits. Additionally, fostering a supportive and inclusive learning environment that promotes face-to-face interactions, peer collaborations, and reflection on technology use can also contribute to mitigating

internet addiction among pre-service mathematics teachers.

Several studies have explored the relationship between internet addiction and motivation to learn among pre-service mathematics teachers. The available evidence suggests that internet addiction can have negative effects on motivation to learn. For instance, a study by Zhang et al. (2021) found that pre-service Mathematics teachers who reported higher levels of internet addiction had lower motivation to learn Mathematics, as evidenced by reduced levels of interest, enjoyment, and perceived relevance of mathematics. Also, Liu et al. (2021) reported a significant positive correlation between academic procrastination, intrusive thinking, depression, anxiety, stress and internet addiction. The mechanisms through which internet addiction may affect motivation to learn are complex. One possible explanation is that excessive internet use can lead to a diversion of attention and energy away from academic tasks, resulting in reduced motivation to engage in learning activities. Internet addiction can also disrupt the development of self-regulation skills, as individuals may prioritize online activities over academic responsibilities, leading to decreased motivation to learn. Moreover, the emotional impacts of internet addiction, such as increased stress and anxiety, can further hinder motivation to learn among pre-service mathematics teachers.

The relationship between internet addiction and motivation to learn among pre-service mathematics teachers has significant implications for teacher education programs. Motivation to learn is crucial for successful learning outcomes and effective teaching practices. Therefore, it is essential for teacher education programs to incorporate strategies for promoting intrinsic motivation, such as providing engaging and relevant mathematics learning experiences, fostering a positive learning environment, and facilitating self-regulation skills. Additionally, addressing internet addiction through education, prevention, and intervention efforts should be integrated into teacher education programs to support pre-service mathematics teachers in developing healthy internet use habits and maintaining high levels of motivation to learn.

2. Statement of the Problem

The widespread use of the internet has led to a growing concern about the impact of internet addiction on pre-service mathematics teachers' learning. Pre-service teachers are the future of mathematics

education and their preparation and training are critical to ensuring the quality of mathematics education in the future. However, the use of the internet for non-educational purposes such as social media gaming, and online shopping has the potential to distract pre-service teachers from academic responsibilities and negatively impact their learning and academic performance. Despite the increasing concern about the impact of internet addiction on pre-service teachers' learning, there is limited research in this area, particularly in the field of mathematics education. This study addressed this gap by investigating the impact of internet addiction on pre-service mathematics teachers' academic performance, and motivation for learning.

3. Purpose of the Study

The purpose of this study is to investigate the impact of internet addiction on pre-service mathematics teachers' learning, academic performance, and motivation for learning. The specific purpose is to determine:

1. If the use of internet affects preservice mathematics teachers learning.
2. the impact of internet addiction on preservice mathematics teachers' learning.
3. the relationship between preservice mathematics teachers' level of usage of internet resources and its impact on learning.

4. Research Questions

The following research questions were answered in the study.

Research Question 1: What is the level of addiction to internet resources by preservice Mathematics teacher?

Research Question 2: What is the impact of internet addiction on Pre-Service Mathematics Teachers' Learning?

The questions allow the study to gain insight into the influence of internet addiction on pre-service teachers' learning and motivation to learning process.

5. Research Hypothesis

The following hypothesis was measured in the study.

H01: There is no significant relationship between preservice mathematics teachers' level of usage of internet resources and its impact on students learning.

6. Social Cognitive Theory of Technology Use (SCT)

The theory that guides this study is the Social Cognitive Theory of Technology Use (SCT), developed by Venkatesh and colleagues (2003). This theory proposes that individuals' use of technology is influenced by their attitudes, beliefs, and perceived behavioral control. In the context of this study, the SCT provides a framework for understanding the impact of internet addiction on pre-service mathematics teachers' learning. According to the SCT, an individual's beliefs and attitudes towards the internet can influence their behavior, such as the amount of time spend online and the extent to which engage in addictive online behaviors. For pre-service mathematics teachers, these attitudes and beliefs may be shaped by their experiences with the internet in their personal and professional lives, as well as by their perception of the role of technology in education.

Perceived behavioral control, or an individual's perceived ability to regulate their use of technology, is also an important factor in the Social Cognitive Theory. In the case of pre-service mathematics teachers, the ability to regulate the internet use may be influenced by the demands of academic program, their personal and professional responsibilities, and the availability of resources to support responsible technology use. Based on the Social Cognitive Theory, it can be hypothesized that pre-service mathematics teachers who have positive attitudes towards the internet believe in its value for learning, and perceive that they have control over their internet use are less likely to engage in addictive online behaviors and will have a positive impact on their learning. Conversely, pre-service mathematics teachers who have negative attitudes towards the internet, do not see its value for learning, and perceive that they have limited control over their internet use are more likely to engage in addictive online behaviors and will have a negative impact on their learning. The SCT provides a useful framework for understanding the impact of internet addiction on pre-service mathematics teachers' learning and can be used to guide the design of this study.

The impact of internet addiction on pre-service mathematics teachers' learning has been a topic of growing interest in recent years, with a number of studies examining this issue from different perspectives. The following investigated the relationship between internet addiction and learning outcomes in pre-service mathematics teachers. Pre-

service mathematics teachers who engage in excessive internet use are more likely to experience negative outcomes in their academic performance and learning, including lower grades, decreased motivation, and decreased academic engagement (Chou & Hsiao, 2000; Ko et al., 2005). The findings of these studies suggest that excessive internet use may be a barrier to academic success and may have a negative impact on pre-service mathematics teachers' learning. In addition to the negative impact on academic performance and learning, internet addiction can have a negative impact on other aspects of life, including relationships, mental health, physical, and decreased in overall well-being.

7. Methodology

This study employed a descriptive study of the correlational type. The population for this research consists of pre-service mathematics teachers of all federal universities in south-west Nigeria, currently have mathematics education as one of their courses of study in the Faculty of Education. Purposive sampling technique was used in selecting one university for the study. University of Lagos was purposively selected out of the eight federal universities in South West Nigeria because the students are still on campus during the study and mathematics education is one of the courses offered. The study covers the undergraduate students from 100 level to 400 level. The mathematics education cohort was purposively selected for the study of which 200 students randomly selected from all cohorts serve as sample size.

A well detailed and structured questionnaire which focused on getting data from pre-service mathematics teachers on internet addiction was used. The instrument was validated and the trial tested at the University of Ibadan to determine the reliability coefficient which eventually yielded 0.79 for the instrument using Cronbach Alpha. The data collected were analysed using mean and standard deviation for the research questions 1 and 2. Pearson Product Moment Correlation Coefficient was used to test the hypothesis raised.

8. Results

Table 1. Level of Respondents

Level	Frequency	Percent (%)
100	34	17.0
200	32	16.0
300	43	21.5
400	91	45.5
Total	200	100.0

Table 1 shows the respondents level of education from 100-400 levels. The percentage were given accordingly.

RQ1: What is the level of Addiction to internet Resources by Preservice Mathematics Teachers?

Table 2. Level of Addiction to Internet Resources by Preservice Mathematics Teachers

S/N	Statement	\bar{x}	σ	Remark
1	I spend most of the day on the internet for noneducational purposes.	2.69	.823	Agree
2	The internet usually interferes with my ability to complete assignment.	2.46	.890	Disagree
3	The internet affects my ability to concentrate in class.	2.30	.845	Disagree
4	I am always distracted by the internet while studying.	2.71	.788	Agree
5	I feel that internet addiction has affected my grades in mathematics.	2.15	.895	Disagree
6	I always miss my classes due to excessive internet usage.	1.90	.865	Disagree
7	The internet has impacted my ability to learn and focus.	3.04	.867	Agree
8	I believe internet addiction affects preservice mathematics teachers' ability to effectively teach mathematics to students.	2.34	.853	Disagree
9	Internet addiction could impact my future career as a mathematics teacher.	2.52	.956	Agree
10	Internet addiction has potentially negative consequences on preservice teachers' mathematics learning.	2.60	.897	Agree

The information above shows that pre-service Mathematics teachers have a mixed view of how the use of the internet affects their learning. Some respondents believe that the internet is a valuable tool for learning, while others believe that it can be a distraction and a hindrance. The majority of respondents agree that using the internet has impacted their ability to learn and concentrate. This implies that while using the internet for learning can be beneficial, doing so should be done in moderation. A significant number of respondents agree that internet addiction could impact their future career as a Mathematics

teacher. This suggests that pre-service Mathematics teachers should be aware of the risks of internet addiction and take precautions to control the usage of the internet.

RQ2: What is the impact of internet addiction on Pre-Service Mathematics Teachers' Learning?

Table 3. Impact of Internet Addiction on Pre-Service Mathematics Teachers' Learning

S/N	Internet Addiction	\bar{x}	σ	Remark
1	How often do you use the internet daily?	4.76	.50	Always
2	How often do you experience difficulties in limiting your internet usage?	3.53	.91	Sometimes
3	How often do you feel guilty or ashamed while using the internet?	2.44	1.11	Rarely
4	How often do you miss a class due to excessive internet usage?	2.33	1.08	Rarely
5	How often do you try to limit your internet usage?	3.35	.89	Sometimes
6	How often do you experience physical discomfort such as headaches or eye strain due to excessive internet usage?	3.07	1.05	Sometimes
7	How often do you miss a deadline because you were spending too much time on the internet?	2.60	1.06	Sometimes
8	How often do you feel that you spend more than usual time on the internet?	3.31	1.06	Sometimes
9	How often do you feel anxious or restless when you are unable to access the internet for an extended period?	3.55	1.16	Sometimes
10	How often do you find it difficult to stop using the internet even when you know you should be doing something else?	3.56	1.04	Sometimes
Average Total		3.25	0.98	

The information above shows that pre-service mathematics teachers use the internet frequently, and

the use has great impact on learning both positive and negative impacts. Pre-service teachers who use the internet effectively can enhance their classroom instruction and deepen their understanding of mathematical concepts. On the positive side, the internet offers a wealth of resources for Mathematics learning, including practice problems, tutorials, and interactive simulations. On the negative side, procrastination, distraction, and information overload are all issues that can arise from using the internet excessively. If not cautious with how the internet is used, pre-service teachers may discover that more time is exploring on the internet than really learning Mathematics. Overall, the internet can be a powerful tool for Mathematics learning, but it is important to use it wisely. Pre-service teachers should develop strategies for managing their internet use and for ensuring using the internet for productive purposes.

Hypothesis

H01: There is no significant relationship between pre-service Mathematics teachers' level of usage of internet resources and its impact on students learning.

Table 4. Relationship between Pre-service Mathematics Teachers' Level of Usage of Internet Resources and its Impact on Students Learning

Variable	N	Mean	SD	P-value	Sig
Level of Addiction	200	3.25	.565	.001	.514
Impact of Addiction to Learning	200	2.47	.550		

According to the above table, research hypothesis is rejected. The standard threshold for statistical significance is 0.05, and the p-value of 0.001 is below that value. This indicates that there is a significant relationship between the use of the internet and how its use affects the learning of students. The correlation coefficient of 0.514 is also significant. This indicates that the two variables have a moderately positive relationship. In other words, students who access the internet more frequently tend to learn more effectively. There are a few possible explanations for this relationship. First, the Internet provides access to a wealth of information and resources that can be used for learning. Second, the internet can be used to connect with other students and teachers, which can provide support and motivation. Third, the internet can be used to create and share learning materials, which

can help students learn in a more active and engaging way.

Overall, the results of this study suggest that the internet can be a valuable tool for learning. However, it is important to use the internet in a way that is productive and that does not lead to distractions or addiction.

9. Discussions of Results

Internet use is common among pre-service mathematics teachers, and it can have both beneficial and detrimental effects on students' learning. On the positive side, the internet provides a wealth of tools for learning Mathematics, such as tutorials, interactive simulations, and practice problems. On the negative side, procrastination, distraction, and information overload are all issues that can arise from using the internet excessively. In general, the internet can be a useful tool for learning Mathematics, but it is crucial to use it responsibly. Pre-service teachers should develop methods for controlling their internet use and making sure that it is being put to good use. The major point of discussion in this study is the impact of internet addiction on pre-service Mathematics teachers' learning.

- The use of internet can have both positive and negative effect on pre-service mathematics teachers' learning. Pre-service teachers who use the internet effectively can enhance their class instruction and deepen their understanding of mathematical concepts. On the other hand, pre-service teachers who are not cautious with how internet is used may discover that internet is spent on other distracting information rather than using it to learn Mathematics.

- Majority of the respondents (69%) agreed that using the internet has impacted their ability to learn and concentrate while significant number of respondents (34%) agree that internet addiction could impact their future career as Mathematics teachers. This shows that while using the internet can have positive effects on the learning of pre-service Mathematics teachers, it should be used in moderation and should also be aware of the of internet addiction and they should take adequate precautions to control their usage of the internet.

- There is a significant relationship between the use of the internet and how its use affects the learning of students. The p-value 0.001 which is less than the standard statistical significance (0.05) shows that the research hypothesis was rejected. The correlation coefficient of 0.514 which is also significant shows

that there is a moderate positive relationship between the two variables (use of internet and how internet affects the learning of pre-service mathematics teachers).

10. Conclusions

It was concluded that the internet can have both beneficial and detrimental effects on students' learning. The internet is an essential tool for pre-service Mathematics teachers. It provides access to a wealth of resources that can be used for learning, including practice problems, tutorials, and interactive simulations. The internet can also be used to connect with other students and teachers, which can provide support and motivation. The internet can also cause procrastination, distraction, and information overload if it is used excessively. In conclusion, the internet can be a useful tool for the learning of pre-service Mathematics teachers learning but it is very important that it must be used responsibly. Pre-service Mathematics teachers should devise strategies for managing their internet usage and ensuring that it is productive.

Authors note:

Sabainah Oyebola Akinoso (Ph. D.) is a Senior Lecturer at the Department of Science Education, Mathematics Education, Faculty of Education, University of Lagos, Nigeria.

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